

FOREST HEALTH OF THE UNITED STATES' FORESTS

SECTION #1, PART #4.

WHAT ARE THE ALTERNATIVE APPROACHES AND POLICIES TO MANAGING OUR FORESTS?

by the

Forest Health Science Panel

A Panel Chartered

by

Charles Taylor, Member
United States Congress

Panel Members:

Chad Oliver, Chair

David Adams, Thomas Bonnicksen, Jim Bowyer, Fred Cabbage,
Neil Sampson, Scott Schlarbaum, Ross Whaley, and Harry Wiant
Congressional/USDA FS Liaison: John Sebelius

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PART #4

Forest Health of the United States' Forests

WHAT ARE THE ALTERNATIVE APPROACHES AND POLICIES TO MANAGING OUR FORESTS?

INTRODUCTION

A policy for managing forests needs to be agreed upon before specific changes in laws, incentives, and other factors can be made. Without an agreed-upon policy, specific changes will not lead in a common direction. Instead, they can contradict each other and so be counterproductive and continue the present confusion. Without an agreed-upon policy, there will also be no way to measure whether specific changes and their subsequent implementation are helping achieve the defined policy. Consequently, instead of positive results being achieved, it will be possible for all advocates to declare whatever occurs as “success”, without any benefit to people or to the environment.

A policy needs to be agreed upon by policymakers; it is not the role of scientists to impose this policy. However, scientists can help with such a vision both by suggesting alternatives and by showing the consequences of each alternative.

“Policy analysis” procedures have been developed to facilitate formulation and analysis of alternative policies. These procedures examine a wide range of alternative policies for achieving objectives (values) and determine the effects of each alternative on each value. There is usually no alternative which is completely satisfactory for all values; however, the objective is to find an alternative which provides the most positive (and fewest negative) tradeoffs for the various values.

To find such an alternative, many policy options need to be examined. Consequently, an open process is needed to help find creative alternatives which may have been previously overlooked. In this paper, the Forest Health Science Panel identifies and analyzes a wide range of alternatives. Subsequently, other options can be suggested and analyzed. A wide range of options is important for several reasons:

1. Analyses sometimes show that a policy option which initially appears promising may actually not be very good at providing the values, and vice versa.
2. The wide range helps give policymakers an understanding of the range of effects of possible alternatives.

3. Neither the analysts nor the policymakers know a priori how the policymakers will weight the different values and choose a policy from among the options until they see the range of tradeoffs among alternatives.

Presentation and analysis of any particular policy option does not imply an endorsement of that alternative. In fact, analysts best serve policymakers if they treat all alternatives impartially. Such has been the goal of this paper.

It is also the role of scientists to analyze the relation of each alternative to each value. The panelists have assumed this role; however, this analysis should also be open for review and improvement by other scientists. There is the possibility that review comments may be focused on discrediting, obfuscating, or delaying the analysis procedure by questioning the certainty and accuracy of various analyses. Systematic ways have been developed for addressing the uncertainty, the substantiveness of errors in analysis, and the policy decisions in light of these.

To avoid overwhelming policymakers with an extremely large number of policy options, similar alternatives are grouped together. Once a general option is agreed upon, detailed variations can be developed by a similar process of developing and analyzing alternatives within a general policy.

This paper will develop and examine alternative strategies in two steps:
Step #1: It will first examine alternative approaches to managing specific forest areas;

Step #2: It will then examine different mixtures of these approaches to develop an overall policy option for forest management in the United States.

APPROACHES TO MANAGEMENT

Various approaches to forest management have been developed. This paper groups these into four general approaches:

Liquidation

Timber management for financial efficiency

Management with no commodity extraction

Integrated management

Liquidation--rapid harvest of the forest for profit or to convert the forest to other uses--was used in the 18th and 19th centuries in the United States and is currently used in some other countries. Except for very minor conversion of forested lands to agriculture, residential development, or similar uses, liquidation of forests is not occurring in the United States. It is not a likely alternative for United States forests and so will not be considered further unless requested.

The other three approaches and their effects will be discussed in detail.

TIMBER MANAGEMENT FOR FINANCIAL EFFICIENCY

Several similar management approaches have been used historically to provide the maximum amount or efficiency of timber products. They were first based on the goal of avoiding an impending timber shortage; later, they have been based on financial efficiency where the primary income source from forests is selling timber products.

These approaches generally involved harvesting old forests rapidly, since trees in these forests were growing slowly, with new growth matched or exceeded by loss of wood to decay. The harvested wood was used for timber products and the old forests were replaced with young, rapidly growing forests.

What is perceived as the most efficient method for timber production has generally changed from selection harvesting to even-aged management on the most productive sites. Under this approach, private landowners generally try to balance cash flow and return on investment, which means slightly shorter rotations than time of maximum sustainable volume per acre (i.e., present net value generally reaches a maximum before mean annual timber volume increment). Early weedings and thinnings are only done on some productive sites, and forests generally cycle between open and dense structures (Figure 1.3).

The U.S. Forest Service has managed (by mandate) for maximum sustainable sawtimber volume (interpreted as culmination of mean annual increment), which means slightly longer rotations and, sometimes, thinnings. Early weedings and thinnings are done on some productive sites, and the forests cycle among open, dense, and (to a limited extent) understory structures.

Sometimes on poor sites, land ownerships where long-term timber management investment is not a goal, and in mixed species stands, uneven-aged harvesting (usually high grading) has been practiced as being most financially efficient. Here, the economically merchantable timber is extracted and the remaining forest was left--either to grow merchantable timber again or, in many cases, to grow crooked and rotting trees of shade tolerant species and little timber value. These forests often provide the complex structures which some species depend on. Research is today showing how it is possible to manage many species by uneven-age management, avoid many of the negative effects noted above, and still provide the complex structures. Such uneven-age management is different than the practice described above.

The result of this financially efficient production of timber has been large volumes of relatively small diameter and low quality timber. High grading and lack of weeding and thinning on many sites has left trees of low quality and undesirable species. Some of this wood is suitable for high volume timber production facilities, but relatively little is useful for high quality production. However, improvements in wood products manufacturing technology have allowed the low quality timber to provide some products previously provided by

high quality timber. It has been viewed as economically more efficient to harvest or purchase trees of high quality from other places in the United States and/or elsewhere in the world, or to utilize substitute products than to grow high quality timber as an investment on private lands.

Timber management for financial efficiency has provided only moderate employment, since a moderate amount of woods labor is needed (relatively little weeding, thinning, or pruning is done) and moderate amounts of manufacturing labor is used.

Habitats provided by this management regime include open and dense habitats on productive sites where intensive plantations are managed (Figure 1.3). On Forest Service lands and elsewhere where thinning is done, some understory habitats are provided. On those areas where “high grade” harvesting is done, many complex structures are provided. The savanna structure is generally not provided. On areas where thinnings are not economically feasible, the forests managed for financially efficient timber production are often susceptible to insects, diseases, and fires.

Demands for outputs other than timber from public and private forests in the United States have led to actions intended to provide non-timber values. Regulations on private lands and rules on public lands have mandated that values other than timber be provided, but the income from timber receipts has generally been expected to pay for these other values on both private and public lands (e.g., forbidding “below-cost” timber sales on public lands). In some cases, the kinds of forest management needed to provide these other values are not profitable from timber receipts; consequently, the forest is not actively managed at all, to the detriment of both timber and non-timber objectives.

INTEGRATED APPROACHES TO MANAGEMENT

Integrated approaches have been proposed and used to varying degrees in many forests. In these approaches, a forest is actively managed to provide many values simultaneously.

The concept of managing for many values has long been part of forestry in the United States and elsewhere. It was part of early United States Forest Service intents and public incentives policies for privately owned forests. It was incorporated into the Multiple Use Sustained Yield Act and National Forest Management Act of the U.S. Forest Service. Programs such as thinning simultaneously to provide habitats, protection from fire and timber products and installation of roads for recreation were instituted; however, the expectation--and later mandate--that these programs be paid for by timber production (described earlier) often led to a domination of management by timber production.

In the 1930's through the 1950's, many programs were instituted (such as through U.S. Department of Agriculture and state programs) to encourage private forests to provide many values. These programs provided information assistance such as soil maps, aerial photographs, and management advice as well as economic assistance to landowners to plant and tend trees, institute erosion control, managed for game and non-game species, and provide other values. Recognizing that many practices on private forest land provided employment, timber production, soil stability, and other values which benefited the general public more than the landowner, cost-sharing incentives were used to partially compensate the private landowner for providing the values. Similar incentives for managing for many benefits were instituted by private institutions, such as Ducks Unlimited.

Early attempts to manage forests for many commodity and non-commodity values began with a focus on managing each stand¹ for these values. Increasingly refined management approaches to provide many values concurrently have been developed in the past two decades, under such names as "Landscape Management" (Boyce 1985, 1995; Boyce and McNab 1994; Oliver 1992a, b) and "High Quality Forestry" (Kuehne 1993, Weigand et al. 1993). These approaches are based on the recent ecological acceptance that forests are constantly changing through disturbances and regrowth--and the values they provide to people and wildlife continually change as the forests change. Following disturbances, forests change through a variety of structures (Figure 1.3). Each structure is suitable for some species and not others; and each structure provides some unique values to people. To provide all species and other values, therefore, all structures need to be maintained in a forest. Individual stands can only provide one structure--and therefore specific values--at any one time. To provide all values, some stands within a landscape need to be in each structure at all times.

Rather than allowing the forest to change randomly without management, forest management can control the changes so each large forest landscape (e.g., an area of 2,000 to 60,000 acres) provides all values in a constantly shifting mosaic across the landscape. This approach uses silvicultural operations to mimic, avoid, and/or recover from natural disturbances, as necessary. The integrated approach would not necessarily manage in a way most financially efficiently for timber production; however, timber would be one value provided as a "co-product" during thinnings and harvesting, with the objective of providing a variety of values.

Like timber management for financial efficiency, integrated management encompasses a range of intensities, from:

¹ A stand is a contiguous area of forest of relatively uniform soil, topography, species mixture, structure, and disturbance history.

- harvesting all stands (including currently existing old trees in the understory, complex, and savanna structures) and providing the full range of structures through active management; to,
- maintaining and protecting existing stands (e.g., old understory, complex, and savanna) as long as they remain viable, but supplementing and replacing them as necessary through silvicultural operations.

Integrated management has been practiced in wildlife habitat areas on public and private lands in many regions. It is beginning to be applied in "Habitat Conservation Plans" being adopted by industrial forest landowners in the Pacific Northwest.

Integration of all values in management actually requires more intensive management and more skill, knowledge, and technology than timber management for financial efficiency. Different silvicultural activities must be applied to different stands to maintain the range of stand structures. The activities include thinning and pruning, controlled burning, weeding, use of longer rotations, snag creation, salvage of dead, dying, and overcrowded trees, even-aged and uneven-aged harvesting systems, and other activities not necessarily done when just managing for timber products. Integrated management would likely provide higher quality timber than timber management for financial efficiency because of the intensive thinning, pruning, and longer rotations; consequently, high quality timber manufacturers would benefit. A diversity of timber species would be provided in the diversity of silvicultural practices. High volume timber manufacturers would utilize the thinnings and tops and mill ends. There might also be a slight increase in total wood volume with integrated management where longer rotations allow greater average sustainable volume growth; however, this increase may be counterbalanced by decreases in wood harvest because of heavy thinnings and leaving snags for wildlife habitat.

Management costs tend to be higher with this more intensive, integrated management, which increases cash outlay by the landowner. Analyses suggest the total return to the government may be high enough in some cases to more than compensate the landowner for the extra management needed to provide the additional values. Returns to the government would be in the forms of reduced unemployment by more labor in silvicultural operations; greater economic activity and resulting tax base with increased employment; more wood flow in thinnings; and the value of other outputs provided by management (e.g., recreation).

Various funding mechanisms have been proposed for providing the cash outlay and management assistance for the landowner to provide public values, including low interest loans to be paid upon timber harvest, state and federal general funds, fees for hunting (e.g., day-use or annual leases), conservation easements, funding from private non-governmental organizations, tax

reductions, and carbon sequestration funds (Lippke and Oliver 1993, Bourland and Stroup 1996, Kennedy et al. 1996). Many of the incentives could be provided by expanding the historically successful U.S. Department of Agriculture and state assistance programs.

MANAGEMENT WITH NO COMMODITY EXTRACTION

The non-commodity approach began as an attempt to maintain some areas free from human activities. Consequently, small and large reserves were created where human commodity extraction activities--especially timber harvesting and grazing--were excluded. This approach began at a time when both scientists and conservationists believed that, without human intervention, forests would remain in a steady-state, equilibrium condition--often referred to as the "old growth" or "climax" condition. Since this was believed to be the stable condition before European colonization of America, it was assumed that areas still in this condition could be reserved and so provide habitats for all species and the other values lost when commodity production was practiced.

The mainstream of ecological science has since rejected the concept of a "natural, stable" condition, because climates have always fluctuated, species have always migrated, and all forest areas have been impacted by both human and non-human disturbances for thousands of years (Oliver and Larson 1996, Sprugel 1991, Stevens 1990). However, the management approach of avoiding active management is still considered in several contexts:

- as a "hands-off" management alternative;
- as a temporary condition while more research is done to determine the effects of more active management alternatives;
- as a means of avoiding blame for possible negative tradeoffs if active management is done.

It must be realized, however, that the expected consequences of a "hands-off" alternative cannot be assumed to be a stable, unchanging condition. The forest will change without intervention through growth, disturbances, invasion of exotic species, climatic changes, and other factors. These "non-human" changes will impact a range of values, including the forest's ability to provide habitats for all species and the forest's aesthetic and recreation values. Buildups of fuels and epidemic levels of native and exotic pests inside these reserves may cause them to act as "centers" for fires and epidemic levels of pests to spread to other forests. Attempts to exclude disturbances--natural or otherwise--have been found to be futile. For example, fire suppression and exclusion policies in National Parks and Forest Service lands during the mid-twentieth century have led to more catastrophic, uncontrollable fires later on.

While intentional management can be modified, minimized, or eliminated, not all human and non-human disturbances can be prevented. Some

disturbances are so large that they impact tens to hundreds of thousands of acres --leading to vast open structures--across hundreds of thousands of acres (Oliver and Larson 1996). Large areas of downed, dry trees left by windstorms become at high risk to very hot fires without the active cleanups and treatments that have historically been undertaken (e.g., Windstorms on the Olympic Peninsula [1921 and 1962], Hurricane Hugo in South Carolina [1989], and 1938 hurricane in New England). Even burned forests are at high risk to reburns during subsequent decades (e.g., partial reburns in the Tillamook Burn in Oregon [1933] and Entiat [Washington] fire of 1970). These hot fires in windblown or previously burned forests are extremely catastrophic because the large accumulation of dry, dead trees on the forest floor fuels very hot fires which damage the soil and kill surviving trees and regeneration.

The response of U.S. environmental leaders to these large disturbances has, in recent years, been either to support some form of active management, or to advocate even larger areas where commodity management is excluded. Another approach has been to suggest “core reserve” areas surrounded by other areas of more active management in different forest landscapes (Hunter 1990).

Modifications of the “management without commodity extraction” approach have been initiated in many areas. For example, National Parks are managed without commodity extraction; however, some areas of intensive human use are mitigated (e.g., trails restored), some “natural” disturbances are controlled to prevent their becoming excessively large (e.g., fires), and access is provided. In Wilderness Areas, less access is provided; however, disturbances are controlled, but no attempt is made to eliminate them. Attempts on many public and private forest lands to prevent all fires resulted in exclusion of Native American (and later European- and African-American) practices of frequent, light fires. The result has been dense forests which have probably not existed to the present extent for thousands of years, if ever.

Most objectives consistent with maintenance of reserves require some form of active management.² This management involves such costs as controlling and recovering from disturbances (e.g., fires), providing access for various recreation and disturbance management activities, and recovering habitats and controlling siltation when disturbances cannot be controlled.

Employment associated with areas managed without commodity extraction is generally much less than with the other two approaches. The employment is primarily from the management activities and from peripheral recreation activities. No timber volume is produced in the reserves; however, creation of new reserves reduces total timber availability and so temporarily

² Professor D.B.Botkin, Professor of Ecology, George Mason University. Paper presented at Policy Analysis Symposium, University of Washington Olympic Natural Resource Center, Forks, Washington, September 19, 1996.

increases timber prices and profits for non-reserved landowners (industrial and non-industrial) in the region--until global trade and substitute products adjust, after which relatively little increase in prices and/or profits remains. During the temporary period of profits for non-reserve landowners, relative scarcity of wood and associated increased prices can make it economically feasible to do intensive thinnings and other activities which also benefit wildlife and other species and values.

EFFECT OF EACH MANAGEMENT APPROACH

The effect of each management approach on each value can be assessed. Then, different mixtures of the different approaches can be developed as specific policy options for managing our forests.

Each general approach described above can be implemented in a range of ways. For example, the "no commodity extraction" approach can be implemented with no activities such as road building or maintenance and fire protection; or it can be implemented to include such activities as road maintenance, fire protection and controlled burning, and restoration of areas impacted by people as long as no commodity extraction is done. For this analysis, an intermediate intensity of each approach has been assumed. It is important to realize that the relations to the different values will vary somewhat if different intensities are used. If policymakers are interested in impacts of different intensities, analyses of these other intensities can be performed.

The effects of the different approaches vary with many factors; however, generalizations of the effects will help policymakers understand the overall effects. These effects are described; if there is disagreement, a rough sensitivity analysis (and, if desired, more detailed analyses can be done to determine the importance of the disagreements).

Table 1.6 shows the assumed effects of each approach on timber harvest, employment, costs, and some other values. These values are only appropriate for comparisons among alternatives, since such analyses as discounting (compound interest rate) and multiplier effects (for effects of harvest on tax revenue) are not done.

Also, the analysis assumes that the management approach under consideration is done to the extent described (for example, where timber management for financial efficiency is assumed for the North, it is assumed to harvest 75 percent of the gross growth [Table 1.6], even though about 40 percent is presently harvested [Part #3]). Consequently, the analyses show the potential of each alternative.

SPECIFIC EXAMPLE OF EACH APPROACH

Timber management for financial efficiency: Much of the timber that is removed from private land in the United States is from land managed using the timber management for financial efficiency approach. National Forests and other public timber³ lands have partly been managed for efficiency of timber commodities, but some areas have been allocated for other primary uses or have not been managed because they are inaccessible. The example assumes increases in management in public and private lands in all areas allocated to this management approach so that 75 percent of the gross timber growth is harvested. Presently accepted protection of streamside areas, unstable or erosive slopes, and similar practices would continue. It is assumed that management would require no public funding on private lands, and that public land management would be a net profit to the public, including payments to state and/or local governments as compensation for not paying other taxes. All management returns benefit the public in the form of increased tax base and reduced unemployment; and federal lands return all profits from timber management to the public (i.e., government).

Integrated management: This example assumes that complex stands within each watershed, constituting 20 percent of the total area, are reserved from timber harvest until they no longer serve as habitats for species needing this structure (because of insects, fires, etc.), after which stands managed as replacements are reserved. Stands other than these complex ones are managed to maintain a minimum of 10 percent of each of the other four structures (Figure 1.3) across the landscape at any time. Timber harvest is assumed to be 65 percent of the present gross growth within each region. Private lands are managed similarly, except that any old complex stands left (there are very few old complex stands on private lands) are harvested as soon as managed stands provide the complex structures.

The costs of private landowner incentives are assumed to be the difference between the profit made by “timber management for financial efficiency” and that made by “integrated management”, calculated for each region. These costs would be borne by the public. Management costs and employment are higher than under “timber management for financial efficiency.” Although total harvest may actually be higher than under commodity management (as discussed earlier), it is assumed for this example that harvest is reduced by about 10 percent of the gross growth.

³ “Timber” land here follows the US Forest Service RPA definition of forest land capable of growing more than 20 cubic feet/acre/year and not legislatively or administratively withdrawn from timber harvest (Powell et al. 1993).

Management with no commodity extraction: It is assumed that a skeleton road system will be maintained within the “no-management” areas and that large fires will be fought; however, smaller fires will follow a “let-burn” policy (similar to the policies of the National Park Service). Payments will need to be made to states and counties to replace lost local tax revenues, and some employment will occur; these are considered costs to the public. Other increased costs to the public are from decreased employment. Where this management approach is done on private lands, the public cost is assumed to be the profit which could otherwise be made by “timber management for financial efficiency” calculated for each region, since this is the income foregone by the landowner which presumably would need to be compensated by the public.

THE EFFECT OF EACH MANAGEMENT APPROACH ON EACH VALUE

The effects of each management approach on the different values described in Table 1.1 are shown in Table 1.3 and Figures 1.5 through 1.7 and described below.

I. VALUES EXPRESSED AS DESIRED CONDITIONS OF THE FOREST

SUSTAINING GROWTH OF FORESTS

Minimizing levels of exotic insect and disease pests

Timber management for financial efficiency would seek to control exotic pest epidemics and populations on economically important species or when required by state and federal regulations (e.g., threatened and endangered species) but not on non-commercial species or when the cost of the control would result in an economic loss.

Integrated management would proactively minimize exotic pest populations and epidemics wherever this approach was practiced to ensure that native species survived, depending upon the importance of the values associated with the native species or land base.

Management with no commodity extraction would allow pest populations to reach epidemic levels and collapse without intervention. Pest epidemics on these lands could have the possibility of affecting surrounding lands that are managed for commodities. If control measures were done to minimize exotic pests, the lack of infrastructure (e.g., personnel, equipment, and roads) on these land bases would make the costs high and limit the effectiveness of these measures.

Minimizing catastrophic⁴ levels of native insect and disease pests

Timber management for financial efficiency would seek to control both endemic and epidemic levels of native pests where it was economically worthwhile to do so and not reduce them below catastrophic levels in other places.

Integrated management would proactively minimize high levels of native pests where they interfered with other values, but would not eliminate endemic levels because they provide food and habitat for some animal species.

Management with no commodity extraction would allow both endemic and catastrophic levels of native insect and disease populations to exist and “run their course,” generally without intervention. Because of the many, contiguous forest areas of small diameter, overly crowded stands in all regions, there would be very large, catastrophic pest outbreaks in many forests. These would result in very large areas in the open and savanna structures, whether or not the outbreaks were followed by burns and reburns. The historic distribution of structures in relatively small mosaics across the landscape are then highly likely to be merged into a new, homogenous condition that will trigger a much different native pest regime and landscape pattern. These pests may also spread to forests outside of areas managed by this approach. If control measures were done to minimize exotic pests, the lack of infrastructure (e.g., personnel, equipment, and roads) on these land bases would limit the effectiveness of these measures.

Minimizing catastrophic levels of native mammals

Timber management for financial efficiency would nearly eliminate these mammals in some situations, control them below catastrophic levels in other situations, and not reduce them below catastrophic levels in other situations--depending on which was most economically worthwhile.

Integrated management would proactively minimize catastrophic levels of mammal pests, but would not eliminate endemic levels of the mammals.

Management with no commodity extraction would allow populations of native mammals to fluctuate, at times reaching catastrophic levels. These mammals may also migrate outside of areas managed by this approach. The lack of infrastructure (e.g., personnel, equipment, and roads) would limit the

⁴ “Catastrophic” is used in this report to refer to conditions of such magnitude that they require special attention to avoid adverse impacts to people or property (such as when state or federal “disaster areas” are designated).

effectiveness of any last-minute measures to control catastrophic population levels of these mammals.

Minimizing catastrophic fire events

Timber management for financial efficiency would include active efforts to exclude or prevent any fires that destroyed timber values. Where fire killed marketable timber, it would be salvaged and sold. Where even-aged management was practiced, the salvage may remove virtually all stems as preparation for replanting. To the extent it would be used as a tool, fire would be used to reduce harvest slash and surface duff as a site preparation or fire control measure.

Integrated management would minimize catastrophic fire events, since these would destroy the dynamic balance of habitats across the landscape. Instead, harvesting and controlled fires would be used to mimic historic ecosystem disturbances. Some timber damaged by fire would be left and some salvage would be done--to the extent these practices helped maintain the balance of conditions across the landscape.

Management with no commodity extraction would allow catastrophic fires to occur in many places. In some places, such catastrophic fires have occurred periodically for over ten thousand years. In other places, low intensity, surface fires had occurred until recently; however, the increase of small diameter, dense stands, mortality, and large areas of fuels of the past few decades poses several considerations. The fires will probably be extremely hot and burn over large areas. The historic landscape mosaics are highly likely to be merged into a new, homogenous condition that will trigger a much different fire regime and landscape pattern. These fires may also damage soils and watersheds, and risk property and people's lives outside of areas managed by this approach. The lack of infrastructure (e.g., personnel, equipment, and roads) would limit the effectiveness of any last-minute measures to minimize the catastrophic effects of such fires. Such fires could also jeopardize adjacent lands managed by other approaches.

Minimizing losses from catastrophic winds and other "natural" events

Timber management for financial efficiency would allow forests impacted by such events to be salvaged, protected from erosion and catastrophic fires, and regenerated, since there would be an economic incentive to remove the wood, and an infrastructure of roads, equipment, and skilled labor capable of accomplishing the task. Losses of timber could be minimized. Losses of other values through disturbances as such as erosion, catastrophic fires and other pests could be minimized if appropriate

regeneration and erosion control measures were included in the management. Complete removal of all merchantable timber may threaten the future habitat of animals needing snags and downed logs.

Integrated management would also allow a forest impacted by such events to be salvaged, protected from erosion and catastrophic fires, regenerated, and otherwise managed to the extent it could most rapidly provide the range of habitats and other values provided before the disturbance. Consequently, the losses of these values would be minimized.

Management with no commodity extraction would not allow losses from forests destroyed by such events to be minimized through salvage, protected from erosion and catastrophic fires, and regenerated. Commodity products would be obtained from elsewhere, as would the commodity based economic infrastructure. There would be large areas of rotting trees and open habitat, often followed by catastrophic insect and disease populations, large fires, and erosion. As the forest regrew, there would be large areas of dense habitat, often excluding species needing the open and savanna habitats. If salvage were allowed, it would probably be extremely costly both to find the labor and machinery and to remove (or otherwise process) the logs, because there would not be an infrastructure of mills to process the removed logs and so offset the costs of salvage. The salvage could occur if:

- there were other, managed forests within a reasonable distance;
- there were roads or other means of access to the downed logs; and
- the event were not so widespread that the infrastructure was unavailable because it was being used to salvage timber on other, managed lands.

SUSTAINING THE GLOBAL ENVIRONMENT

Avoiding atmospheric carbon dioxide (CO₂) and other pollutant buildups

Timber management for financial efficiency would provide timber products for use in construction to offset the much-higher CO₂ emissions associated with mining, manufacture, transport, and disposal of substitute materials like steel, concrete, aluminum, and brick. Where forests are managed sustainably, the carbon stored in forest trees and soils will, over time, remain stable or continue to increase slowly, providing a net CO₂ global benefit. Each harvest cycle produces added carbon to be stored in products or in landfills, substituted for petroleum fuels, or substituted for other building materials. Management which avoids catastrophic forest fires will also reduce this substantial contribution of CO₂ to the atmosphere. This management would therefore greatly help avoid the buildup of CO₂ and other pollutants to the atmosphere, by keeping CO₂ from being added through

fossil fuel use and by taking CO₂ from the atmosphere and storing it in organic matter in the forest and forest products.

Integrated management, where total harvest is assumed to be 10% less than management for financially efficient timber production, will provide fewer total wood products to help reduce atmospheric CO₂ as described above. This management would probably keep more timber (and thus stored carbon) on the land through all phases of management through longer rotations and other practices. The greater stored carbon in the forests may partially offset the negative impact of any reduced timber utilization. The increased use of prescribed fire in fire-adapted forest types can lower total CO₂ emissions from these forests by reducing wildfire risk.

Management with no commodity extraction would not harvest timber, so more polluting substitute products (or timber imported from elsewhere in the world) would be used and thus contribute significantly to the CO₂ addition to the atmosphere. As the forests grew, carbon would be stored as living and dead organic material, but would be released to the atmosphere either as disturbances destroyed the forest and allowed the wood to burn or rot or as the forest became very old and trees rotted as fast as they grew. Large wildfires can add very large amounts of CO₂ to atmosphere, particularly where past fire suppression has allowed large amounts of living and dead trees to accumulate. If wildfires are severe enough to cause soil damage or excessive nutrient loss, the resulting vegetation may remain in brush fields for many decades. These brush fields take much less CO₂ out of the atmosphere than forests. If these forests were thinned to avoid catastrophic fires and the unused litter burned in a controlled way, these controlled fires would add much less CO₂ to the atmosphere. This thinning would be extremely costly if the forest were thinned and the trees removed but not used for wood products to help offset the thinning costs. Consequently, this management approach would not be very helpful in keeping CO₂ out of the atmosphere.

Conserving native forests in other countries

Timber management for financial efficiency would provide large amounts of timber, thus reducing any need to import wood and possibly even exporting wood (net) to other countries. Only certain types of wood raw materials and/or specialty products would be imported; and these could be offset by a net increase in exports of other woods. Consequently, native forests in other countries would have a quite high chance of being conserved compared to the other approaches.

Integrated management would also provide large amounts of timber, thus reducing the need to import wood and possibly even exporting wood (net) to

other countries. It may provide slightly less total timber volume, but could provide a greater variety of species and sizes of timber. Only certain types of wood raw materials and/or specialty products would be imported; and these could be offset by a net increase in exports of other woods. Consequently, native forests in other countries would have a moderately high chance of being conserved compared to the other approaches.

Management with no commodity extraction would not harvest timber and so would require use of timber imported from elsewhere in the world (or use of more polluting substitute products). This timber harvest would often come from developing countries with fewer environmental restraints on methods of timber harvest and management than in the United States. Therefore, native forests in other countries will probably decline in order to provide wood exports to the United States.

ENSURING PLANT AND ANIMAL DIVERSITY

Conserving and restoring native forest types and species

Timber management for financial efficiency would manage those forest areas and species which would be financially profitable based on the timber. Except where such regulations or voluntary actions as streamside protection of “best management practice” activities were taken, this approach would not necessarily conserve or restore native forest types unless it were economically efficient to do so.

Integrated management would seek to conserve and restore native forest types and species through proactive management. There would likely be a net increase in the area and variety of native forest types and species.

Management with no commodity extraction would avoid active management to conserve and restore native forest types and species, but would avoid commodity-management activities which might further endanger them. Forest types or species affected by exotic or native pests, air pollution, or similar factors may become endangered and possibly eliminated because of a lack of intervention (e.g., the effects of the balsam wooly adelgid and air pollution on the red spruce/Fraser fir ecotype in the Appalachian Mountains). Any activities to conserve and restore native forest types and species would be very expensive, since there would not be a good infrastructure of roads, equipment, and trained labor to do the activities, and no processing of timber would be done to offset the costs. This management approach would be a “holding action” that does not increase the area or variety of native forest types and species.

Providing habitats for native species within forest types

Timber management for financial efficiency would only provide those habitats which were compatible with economically efficient commodity management, except where such regulations or voluntary actions as streamside protection of “best management practice” activities were taken. The open and dense structures would primarily be provided in some cases, while only complex structures might be provided in other cases--depending on whether even-aged or selective harvesting were more economically efficient. The overall habitat diversity in any area would be quite low.

Integrated management would provide all habitats, since a conscious effort would be made to protect or proactively create structural features of these habitats. Overall diversity in each area would be quite high.

Management with no commodity extraction would allow non-human patterns of growth and disturbance to provide changing structures across the landscape. Extremely large reserves (millions of acres) might eventually reach a condition where disturbances and regrowth result in a rough, fluctuating balance of habitats. Smaller reserves would probably cycle through extremes between, at one time, too little open and savanna structure to support species depending on these structures but very much of the closed structures and, at another time soon after a very large disturbance, very much open and savanna structures and too little of the closed structures to support species dependent on them. Overall habitat diversity would likely be moderate in each area, but would probably fluctuate widely.

Ensuring survival and recovery of threatened and endangered species

Timber management for financial efficiency would generally provide habitats for a limited number of species. Protection of threatened and endangered species would probably require dramatic management shifts--and a lag time--to provide suitable habitats for these species.

Integrated management would provide most of the habitats across the landscape (a “coarse filter” species management approach). If a species still became endangered, there would be some habitats which were almost suitable and could be proactively improved upon rapidly--as well as a management infrastructure to do the targeted, proactive management.

Management with no commodity extraction would allow a haphazard mixture of habitats across an area, but not necessarily the habitats of the threatened and endangered species. Not doing active management would not necessarily save the species if it became endangered in spite of, or because of, the presence of reserves. If a species became endangered, there would not necessarily be an almost suitable habitat which could be

rapidly improved upon, nor an infrastructure to improve upon the existing habitats.

Protecting native species from invasive exotic plant species

Timber management for financial efficiency would seek to reduce exotic plant pest populations affecting commercial timber production. Diversity would be maintained in commercial species, but not in non-commercial species affected by exotic plant pests. On the whole, native species diversity will probably decline as exotic species increase.

Integrated management would seek to control invasive exotic plant pests in areas associated with important values. Diversity may or may not decline, depending on the level of infestation in specific forest types. Therefore, diversity of native species will be less likely to decline, and may even increase with control of invasive exotics.

Management with no commodity extraction will seek to limit invasive exotic species by minimizing roads and similar avenues of dispersion of these species. Large disturbances (e.g., burned areas) may allow rapid dispersal of some pests along with native, pioneering species. Diversity of native plants would be maintained in undisturbed areas, but may be seriously affected in disturbed areas, including road beds. High exotic pest populations in these areas could raise the probability of the spread of exotic plants to adjacent properties managed by other approaches. Any actions to actively eliminate invasive exotic pests would be very expensive, since there would not be a good infrastructure of roads, equipment, and trained labor to do the activities and no processing of timber would be done to offset the costs.

Maintaining genetic diversity and architecture

Timber management for financial efficiency when artificial regeneration is used may decrease or increase genetic diversity and retain or affect local genetic architecture, depending on the seed origin and genetic diversity of the planting stock. Artificial regeneration using non-improved planting stock may alter genetic diversity and local genetic architecture, depending on seed source and the number of trees from which the seeds originated. The altered genetic architecture or diversity may help maintain the viability of species or populations at risk from introduced diseases (e.g., white pine blister rust and tree improvement programs in western white pine), pollution, or climate change.

Use of genetically improved planting stock may decrease or increase genetic diversity and may alter genetic architecture, but will increase fiber

yield over non-improved planting stock. This genetically accelerated growth can provide more timber from some areas, and so reduce the pressure to harvest native forests in other, highly sensitive areas. When natural regeneration is used, genetic diversity and genetic architecture is preserved, but timber yields will probably be lower than when artificial regeneration with genetically improved stock is used.

The concerns described above can be mollified under this management approach if targeted actions are taken to ensure the genetic diversity and architecture are maintained.

Integrated management would seek to maintain the range of genetic diversity by ensuring all genomes were maintained within a population, using a mixture of natural and artificial regeneration with care toward maintaining the genetic diversity and architecture. The genetic diversity and architecture of various species could be maintained or altered if necessary to develop a strain of the species more resistant to exotic pests, air pollution, or climate change.

Management with no commodity extraction would improve the chances of maintaining the range of genetic diversity and architecture since all regeneration (genetic recombination) would be done without artificial breeding or planting. There would be less opportunity for developing, and interdicting into the forest, genetic strains of native species which are resistant to exotic pests, air pollution, or climate change.

ENSURING THE PRODUCTIVITY OF FUTURE FORESTS

Maintaining site quality

Timber management for financial efficiency would probably maintain the site quality, but might reduce productivity or increase pathogens if it concentrated management on a few species for several rotations. It might also overtax extremely fragile soils under improper management, thus reducing the long term potential to maintain the soil quality, microbes, or nutrients in some circumstances. Overtaxed soils could be rejuvenated where economically efficient through disking, plowing in organic matter, fertilizing, and other treatments.

Integrated management would generally maintain site quality by allowing less artificial concentration on maximum production of a few species. Consequently, more organic matter and species diversity would be maintained on the forest floor, thus reducing the possibility of overtaxing the soil.

Management with no commodity extraction would maintain site quality except where large, catastrophic disturbances occurred. Since mitigation

efforts would not occur after these disturbances, secondary disturbances (e.g., reburns or burns in windblown trees) could create both erosion and soil sterility.

Sustaining watersheds

Timber management for financial efficiency would make the watershed less susceptible to extreme catastrophes which can disrupt the watersheds for many years. This approach may reduce its sustainability through chronic siltation and other disturbances if there are poorly designed roads, non-restored skid trails, or similar conditions. Although all adverse effects of management can not be completely avoided, the effects are generally avoided through state forest practices rules or voluntary “best management practices.”

Integrated management would similarly make a watershed less susceptible to extreme catastrophes, but might not completely avoid the chronic problems of forest management described above. There would be more proactive restoration of riparian zones and other conditions, which would increase the sustainability of watersheds.

Management with no commodity extraction might avoid the chronic problems caused by active management, but would make the watersheds more susceptible to the extreme catastrophes which could disrupt them for many years or centuries. As described earlier, some of these catastrophes (especially fires in the Inland West) may be more extreme than have occurred during the past few thousand years, and so will probably cause more extreme damage to the watersheds.

Maintaining the forest land base

Timber management for financial efficiency would give strong incentives to maintain forests only as long as the economic potential favored forest management over alternative uses of the land. Tax and other incentives might be needed to ensure continuity of forests and forest management.

Integrated management would give incentives to the landowner to maintain the land in forests, even if it were not financially efficient for timber production alone.

Management with no commodity extraction would allocate this land permanently as forest reserves, and so it would remain in the forest land base. Setting aside such reserves on part of the land base would increase the value of the remaining land for producing forest commodity values, and so increase the incentive to keep the unreserved lands as forests. Such set-asides may, alternatively, shift timber production and associated impacts to

other regions, or may trigger a shift to other materials with similar shifts of impacts.

II. VALUES EXPRESSED AS CONTRIBUTIONS TO THE QUALITY OF HUMAN LIFE (BUT NOT DESCRIBED ABOVE)

TIMBER PRODUCTS

Timber volume

Timber management for financial efficiency would provide high volumes of timber.

Integrated management would provide intermediate to high amounts of timber volume.

Management with no commodity extraction would not provide timber.

Timber quality

Timber management for financial efficiency tends to promote relatively short rotations with little thinning or other intermediate silvicultural operations which increase diameter and clear stems. Forest owners in some locations or organizational situations are finding it worthwhile to thin, prune, and do other long-term forestry investments; however, most forest owners do not find these profitable from investment or cash-flow perspectives at present. Tax and/or other incentives, or removal of uncertainties for forest landowners, may be needed to promote longer rotations.

Integrated management would likely provide a wider array of species and greater quantities of large log diameters than under the financial efficiency alternative.

Management with no commodity extraction would not provide timber.

Selected species

Timber management for financial efficiency tends to favor growth of those species most preferred for timber products.

Integrated management would tend to promote growth of a wider variety of native species, so that species traditionally preferred for timber production would be somewhat less available than under the financial efficiency approach.

Management with no commodity extraction would not provide timber and so would not provide the selected species currently used for timber products.

Non-timber, non-wildlife products

Timber management for financial efficiency would provide those products which would be found in stand structures compatible with financially efficient management. Consequently, this approach would provide some, but not all such products.

Integrated management would provide a variety of these values since it would maintain the range of stand structures across a landscape--and therefore provide, and make accessible, products associated with each structure.

Management with no commodity extraction may not allow such products to be removed. If removal of such non-timber, non-wildlife products were permitted, access to them would be difficult since only a skeletal road infrastructure would be maintained. In addition, no commodity intervention would probably provide only some structures across an area at one time (described under “providing habitats for native species within forest types,” above), and products associated with certain structures might not be plentiful if the structure were limited.

Reserve areas

Timber management for financial efficiency would not provide forests “free from the obvious hands of people” associated with reserve areas.

Integrated management would also not provide forests “free from the obvious hands of people” associated with reserve areas, but would provide more forested area which contained the diversity of habitats which have existed for the past few thousand years than would be provided under the financial efficiency approach.

Management with no commodity extraction would provide this value, since it would provide forests free of management for commodity extraction.

RECREATIONAL OPPORTUNITIES

Remote recreation opportunities

Timber management for financial efficiency sometimes provides forests which appear managed and intensively manipulated by people; however, many forests which the public visits and assumes are unmanaged are in fact managed economically for timber production. Remote recreation experiences would be limited because of the dense network of roads.

Integrated management would provide moderate amounts of remote recreation experiences because of the variety of forest structures and

habitats across a landscape and the presence of some large land areas between roads.

Management with no commodity extraction would provide the most opportunity for remote recreation, because these areas would be unroaded and remote from active management.

Accessible recreation opportunities

Timber management for financial efficiency would provide accessible recreation because there would be a good road system; however, the forests would not have the diversity of stand structures important for a wide variety of recreation experiences.

Integrated management would provide both accessibility through the road system and the diversity of stand structures important for a wide variety of recreation experiences.

Management with no commodity extraction would not provide very many roads; consequently, accessible recreation experiences would be extremely limited. Any roads maintained in these reserves would be very expensive, since there would not be a good infrastructure of roads, equipment, and trained labor to do the activities and no processing of timber would be done to offset the costs.

RURAL LIFESTYLE

Commodity-dependent lifestyles

Timber management for financial efficiency would provide an intermediate amount of jobs to maintain this lifestyle. Since only those forest operations would be done which are economically justified based on timber production, relatively little thinning and similar silvicultural jobs would be provided. Therefore, there will be a moderate opportunity for this lifestyle.

Integrated management would increase the amount of jobs in the increased silvicultural operations and in recreation. Consequently, there will be more opportunities for this lifestyle compared to the other alternatives.

Management with no commodity extraction would essentially eliminate the extractive-resource dependent rural lifestyle since there would not be commodity production. Any increase in employment for fire fighting will be temporary in an area; and employment to restore or manage forests would be very expensive without marketing forest products to offset the costs.

Non-commodity -dependent lifestyles

Timber management for financial efficiency would maintain forests with roads for access, but might not provide the diversity of habitats and aesthetic beauty sought by this lifestyle. Therefore, there would be only moderate opportunities for this lifestyle.

Integrated management would provide the access, habitat diversity, scenic beauty, recreational opportunities, and relative safety from catastrophic fires which would be conducive to this lifestyle. Therefore, opportunities for this lifestyle would be enhanced.

Management with no commodity extraction would provide some recreation and some diversity of habitats. Remote recreation, however, does not provide as much income to local communities as accessible recreation. This small income from recreation and the restricted access through the limited road system, the danger of catastrophic fires, and the lack of developed recreational experiences would provide only moderate opportunities for this lifestyle.

Earnings, employment, and value-added goods and services

Timber management for financial efficiency would provide high wage jobs in the forest management and timber products processing industry.

Integrated management would also provide high wage jobs in the forest management and timber products processing industry.

Management with no commodity extraction would primarily provide a limited number of jobs in the recreation and tourism industries, because of the lack of a variety of recreational opportunities. In addition, these industries generally pay low wages and salaries.

Water volume and usefulness

Timber management for financial efficiency would make the watersheds less susceptible to extreme catastrophes than management without commodity extraction. Financially efficient management would have greater chronic siltation, however, and greater total water yield than would occur between disturbances under no-commodity management. Much, but not all, of the chronic siltation can be avoided through management practices commonly practiced at present.

Integrated management would result in conditions like financial efficiency management, except there would be more opportunities for proactive restoration of riparian zones and other conditions, which would reduce the siltation and other negative effects of the water.

Management with no commodity extraction might avoid the chronic problems caused by active management, but would make the watersheds

more susceptible to extreme catastrophes which could disrupt the soil and might result in many years of high siltation and less regular water flows, but greater flows during floods.. After such catastrophes, the water flow may be higher, but would occur in high volumes following rains and snowmelt and minimally during droughts. There would also be large amounts of sediment in the streams and rivers.

Game and non-game fish and wildlife

The same conditions apply here as apply to the value “Ensuring plant and animal diversity by providing habitats for native species within forest types,” described above.

ECONOMIC VIABILITY OF VARIOUS PRIVATE FOREST LANDOWNERS AND FOREST PRODUCTS AND RECREATION SEGMENTS

Viability of small, private non-industrial forest landowners

Timber management for financial efficiency would allow small, private non-industrial landowners to remain moderately viable, as they are today. Adoption of policies to eliminate uncertainty and to remove disincentives to long term management would likely stimulate timber production on private lands.

Integrated management would also allow these landowners to remain moderately viable, assuming moderate incentives were given for their forests to provide non-commodity values to society.

Management with no commodity extraction on private forest lands would mean these private landowners would not remain viable; however, if this management were practiced on other lands (e.g., public lands), the timber values and hence viability of the private forest landowner segment could increase. Another possible outcome, however, is that management without commodity extraction will shift timber productivity and associated impacts to other regions or the country and world, or will trigger a shift to other raw materials with similar shifts in impacts.

Viability of private, industrial forest landowners

Similar conditions apply here as apply to the value “Contributing to the quality of human life by providing a viable small, private non-industrial forest landowner economic segment,” except:

- the economies of scale allow private industrial forest landowners to avoid some of the disincentives of long term forest management and so be somewhat more financially viable;
- the economies of scale would probably allow private industrial forest landowners to provide wildlife habitats and other non-commodity values with fewer incentives.

High-volume timber products manufacturers

Timber management for financial efficiency would provide this economic segment with large amounts of relatively inexpensive timber. The timber may not be of the most desired quality or species, but technological innovations could allow much of it to be manufactured into useful products.

Integrated management would provide this economic segment with moderately high amounts of timber of both low and high quality, of a variety of species including those most often used by this economic segment.

Management with no commodity extraction would not provide wood; consequently, it would not contribute to this industry's viability.

Products manufacturers utilizing high quality timber

Timber management for financial efficiency would provide relatively little high quality timber from private lands, and so would not contribute strongly to the viability of those industry segments requiring high quality wood. This strategy would likely stimulate innovations aimed at using low quality wood and substitute materials as a raw material for high value-added products.

Integrated management would likely provide a wider array of species and greater quantities of larger log diameters than under the economic efficiency option. However, this option may provide less timber.

Management with no commodity extraction would not provide any timber, and so would not contribute to the viability of this economic segment.

The recreation industry

Timber management for financial efficiency would provide a moderate amount of accessible recreation because there would be a good road system; however, the forests would not have the diversity of stand structures which are important for a wide variety of recreational experiences. Consequently, it would not contribute strongly to the viability of a recreation economic segment.

Integrated management would provide both accessibility through the road system and a diversity of stand structures, and thus support a wide variety of

recreational experiences. Consequently, it would contribute strongly to a viable recreation economic segment.

Management with no commodity extraction would not provide very many roads; consequently, any recreation would not be very accessible. Any roads maintained in these reserves would be very expensive, since there would not be a good infrastructure of roads, equipment, and trained labor to maintain the roads and no processing of timber would be done to offset the costs. A limited economic segment associated with this remote recreation would be maintained.

Low public costs of managing forest lands

Timber management for financial efficiency on private or public lands should be economically self-sufficient, based on returns from timber receipts; consequently, there would be no cost to the public. In addition, there would be employment and tax revenue generated by the economic activity, property tax payment, and direct returns to the government from managing public lands.

Integrated management would assume the public pays for the non-timber values provided by the landowners--or the loss in revenue to the landowner for not being able to manage for maximum economic return from the land. However, analyses in the Pacific Northwest have suggested the net return to the state and federal government would be about 1.5 times the loss to the landowner. This increased revenue is because there is increased employment and increased economic activity compared to the economically efficient management approach (Lippke et al. 1996). Had the public (government) paid the cost of lost revenue to the landowner for providing these values, the government's net cost (cost minus return) would have been negative. Consequently, although there may be more cash outlay by the federal government for integrated management than for economic efficiency management, the net cost (cost minus returns) to the government may be lower.

Management with no commodity extraction would cost the public for any access roads, management to eliminate exotic pests, fire protection, or fire fighting. In addition, there would be payments to local governments by National Forests instead of taxes if these forests were managed this way. If private forests were managed without commodity extraction, taxes would have to be reduced, other sources of income would have to pay for the taxes, or the land would soon be abandoned--all of which would be high costs to the government.

Scenic, existence, and historical values

Timber management for financial efficiency would maintain the forest cover and protect it from catastrophic disturbances, but would not necessarily consider scenic, existence, and historical values in management decisions. The historical diversity of habitats would not be maintained.

Integrated management would provide the diversity of habitats and structures and protect the forest from catastrophic disturbances. Proportions of habitats and forest structures may differ somewhat from historical levels and the effects of management may be visible in some areas.

Management with no commodity extraction would provide forests with little intervention and fluctuating habitats and structures, but would not protect the forest from catastrophic disturbances. These disturbances could negatively affect scenic and historical values, but existence values would be maintained.

Spiritual and cultural values

Timber management for financial efficiency would not provide the “untouched”, “ritualistic”, or otherwise specially managed areas or species of significance to certain American subcultures.

Integrated management would not provide large untouched areas, but would provide special species, structures, and protection from natural disturbances as well as protection of cultural sites.

Management with no commodity extraction would provide protection to large areas where this exclusion of activity is considered valuable. Such values might, however, be lost as a result of increasingly likely catastrophic disturbances.

GENERALITIES ABOUT THE MANAGEMENT APPROACHES

Several generalities can be made about the approaches, upon examination of Figures 1.5, 1.6, 1.7, and Table 1.3:

“**Integrated management**” provides the most positive and fewest negative tradeoffs. Only the value “reserve areas” is not well or moderately well provided.

“**Timber management for financial efficiency**” provides the next fewest negative tradeoffs, but more values which are only moderately well provided.

“**Management without commodity extraction**” provides the fewest positive tradeoffs and most negative tradeoffs. The only values which are better provided by this approach than by the “integrated” approach are “reserves areas” and “remote recreation.”

POLICY OPTIONS FOR THE UNITED STATES' FORESTS

It may be difficult to apply some of the approaches to some forest ownerships. For example:

Private non-industrial and industrial forests

Applying the management without commodity extraction approach to large areas of private lands would be extremely costly, since the landowners would probably need to be compensated for their lost income. Small areas may be purchased or traded (in land trades with public lands), however.

Either integrated management or timber management for financial efficiency could be applied to broad areas of private lands by increasing the various federal and state incentives programs and by encouraging environmental organizations to provide such incentives (e.g., the Nature Conservancy and Ducks Unlimited). Some private, industrial forestland owners are using their economies of scale to undertake various forms of "integrated management" on some of their forests (e.g., Plum Creek Timber Company, Boise Cascade Corporation, Potlatch Corporation, and Weyerhaeuser Company in the West).

Increasing regulations will generally not lead to more "integrated management" or "timber management for financial efficiency", especially on private, non-industrial forests.

There is no guarantee that landowners would manage and harvest their land if the "timber management for financial efficiency" option is applied to private landowners. Imported timber and substitute products may keep timber prices down and make such management unattractive to many landowners.

National Forests

The National Forests could be managed by any of the three approaches, with appropriate legislation. (Wilderness areas and other such legislatively withdrawn areas are discussed under "Reserves," below.) Applying the "management without commodity extraction" approach will cause dramatic demographic shifts and social upheaval as people lose their jobs--especially in the western regions.

Reserves

Currently legislatively and executively defined "reserves" could be managed by any of the three approaches, with appropriate legislation. Some reserves, however, contain relatively unproductive forests, and "timber management for financial efficiency" would be difficult.

Other publicly owned forests

Many of these forests are owned by states with various state and federal mandates for their management. Applying “management without commodity extraction” to these areas may be as difficult, and costly, as applying this management to private lands. Either “integrated” and “timber for financial efficiency” management could be applied, with appropriate incentives.

THE SPECIFIC OPTIONS

It may be desirable to allocate different forest ownerships to different management approaches to achieve the desired mix of values. Eight such mixtures are described and analyzed below as policy options. (The three alternatives described above could also be considered as options if applied to all forests.) Other options can also be suggested and analyzed.⁵

These options and their tradeoffs are shown in Tables 1.4 and 1.5. Charts displaying the effect of each policy option on each value for each region and the United States as a whole are shown in Section 2 of this report.

⁵ The analysis process is contained on personal computer spreadsheets; different options can be readily analyzed.

Use of displays of policy options

Policymakers may choose among these options to guide revisions of laws managing federal lands and incentives and regulations on other forests, depending on what values they feel are important.

The displays of estimated employment and timber harvest are not intended to be predictive. They show the maximum timber employment, timber harvest, and other values if the option were implemented according to the assumptions stated in this paper. It is useful in determining the upper limit of what is possible. Other factors could reduce this upper limit. For example, there is no prediction that timber harvest would increase in the North under any circumstances--although it does show that it could increase under most options to the amounts stated. In fact, it is probable that more timber would be imported and substitute products would be used before the harvest rates shown in this report are completely realized. The purpose of the displays is to give policymakers a “mental model” of the bounds of effects of different management practices on different regions and ownerships.

Using this report and other information, the policymakers will determine whether a value is important, and what weight it should have.

For example, policymakers may determine that the only important values are:

- “Sustaining the global environment by preserving forests in other countries”;
- “Providing accessible recreation opportunities”; and,
- “Providing rural, non-extractive, resource-dependent life styles.”

These policymakers may also determine that the “Accessible recreation opportunities” are three times as important as the other two values. They would then choose a policy option which gives the fewest negative tradeoffs to these values. Presentation of the other values, however, shows the policymakers and the public that they are aware of the effects of their decision on these values, even if they do not feel the values are important (Morgan and Henrion 1990). (Such an awareness helps avoid post-facto discounting of negative effects as “the law of unforeseen consequences.”)

Policy Option #1. “Timber Management Option.” This option allocates current legislatively withdrawn “reserves” to the “management without commodity extraction” approach. All other lands are managed by the “timber management for financial efficiency” approach.

Policy Option #2. “Expanded No-Commodity Areas and Timber Management Option.” This option allocates current legislatively withdrawn “reserves” and half of the National Forests to the “management without commodity extraction” approach. All other lands are managed by the “timber management for financial efficiency” approach.

Policy Option #3. “National Forest and Private, Non-industrial Forests Integrated Management Emphasis Option.” This option allocates current legislatively withdrawn “reserves” to the “management without commodity extraction” approach. Other National Forest and all non-industrial private forest lands are managed by the “integrated management” approach, presumably expanding various federal, state, and county incentives programs and by encouraging environmental organizations to provide such incentives (e.g., the Nature Conservancy and Ducks Unlimited). Other public forests and private industrial forests are managed by the “timber management for financial efficiency” approach.

Policy Option #4. “Expanded No-commodity, National Forest and Non-industrial Forests Integrated Management Emphasis Option.” This option allocates current legislatively withdrawn “reserves” and half of the National Forests to the “management without commodity extraction” approach. The other half of the National Forests and all non-industrial private forest lands are managed by the “integrated management” approach, presumably expanding various federal, state, and county incentives programs and by encouraging environmental organizations to provide such incentives (e.g., the Nature Conservancy and Ducks Unlimited). Other public forests and private industrial forests are managed by the “timber management for financial efficiency” approach.

Policy Option #5. “National Forest Reserves, and Private, Non-industrial Forests Integrated Management Emphasis Option.” This option allocates current legislatively withdrawn “reserves” and all National Forests to the “management without commodity extraction” approach. Non-industrial private forest lands are managed by the “integrated management” approach, presumably expanding various federal, state, and county incentives programs and by encouraging environmental organizations to provide such incentives (e.g., the Nature Conservancy and Ducks Unlimited). Other public forests and private industrial forests are managed by the “timber management for financial efficiency” approach.

Policy Option #6. “National Forest, Public, and Forest Industry Integrated Management Emphasis Option.” This option allocates current legislatively withdrawn “reserves” to the “management without commodity extraction” approach. Other National Forest and all other publicly owned forest lands and industrial private forest lands are managed by the “integrated management” approach, building on the concept of large landowners developing “Habitat Conservation Plans” to protect species. This strategy relieves non-industrial

private landowners of any incentives or obligations to manage other than by the “timber management for financial efficiency” approach.

Policy Option #7. “National Forest Reserves and Public, and Forest Industry Integrated Management Emphasis Option.” This option allocates current legislatively withdrawn “reserves” and all National Forests to the “management without commodity extraction” approach. All other publicly owned forest lands and industrial private forest lands are managed by the “integrated management” approach, building on the concept of large landowners developing “Habitat Conservation Plans” to protect species. This option relieves non-industrial private landowners of any incentives or obligations to manage other “timber management for financial efficiency” approach.

Policy Option #8. “National Forest Reserves and Integrated Management Emphasis Option.” This option allocates current legislatively withdrawn “reserves” and all National Forest land to the “management without commodity extraction” approach. Other lands are left to be managed by the “integrated management” approach.

SUMMARY OF POLICY OPTIONS

The management approaches applied to private, non-industrial forest lands will generally determine the values provided in the North and South, because most forests are under this ownership in these regions (Figure 1.2).

Applying a management approach to National Forests will strongly influence the values provided in the Inland West, Pacific Coast, and Alaska, because National Forests own a large proportion of the forests there.

Applying a management approach only to the private, industrial forest lands will not strongly influence the values provided in each region, because these landowners do not own large amounts of forest land in any region.